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# Special Issue: Myogenesis
## Introduction

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Skeletal muscle is a vital tissue for movement, metabolism and breathing. The process of its formation is known as myogenesis. Skeletal muscle has a highly ordered biophysical structure and is also very plastic, capable of adapting to adverse conditions. One of principal features of skeletal muscle is its ability to regenerate after injury, which relies on a population of adult muscle stem cells called satellite cells. Muscle regeneration from satellite cells recapitulates many of the steps of early developmental myogenesis. Skeletal muscle biology is studied from many different viewpoints: genetic diseases, sports medicine, physiology, immunology, developmental biology, gene regulation and regeneration. In recent years, advances in our understanding of the mechanisms of genetic muscle disease and acquired muscle dysfunction, such as atrophy, cachexia, autoimmune disease and ageing, have lead to a major new focus on translational research and pharmacological, gene and cell-based therapies for clinically important muscle pathologies.

This Special Issue of *FEBS Journal* focuses on myogenesis. It features a mixture of invited reviews and hypotheses contributed by speakers at two excellent conferences on skeletal muscle held in June 2012: *Frontiers in Myogenesis*: *Development, Function and Repair of the Muscle Cell*, organized by the Society for Muscle Biology in New York, and *New Directions in Biology and Disease of Skeletal Muscle*, in New Orleans. Additional contributions from other prominent researchers covering emerging topics on muscle research are also included.

This collection of papers reflects the range of topics discussed at both meetings. Our understanding of adult skeletal muscle is explored, as are its maintenance and its cross-talk with non-muscle cell types and regulatory modulators. Muscle satellite cells are viewed from several perspectives: their interactions with niche components; how their homeostatic quiescence state is maintained in adult muscle; and how their function declines with ageing. The mechanisms underlying successful muscle regeneration are examined, in addition to its coordination with inflammatory responses and how fibrosis develops when regeneration is dysregulated. Complementing these discussions are additional reviews on pathological manifestations severely affecting skeletal muscle: rhabdomyosarcoma, atrophy, fibrosis, myopathies and muscular dystrophies. New emerging areas of research include new paths for gene- and stem cell-based therapeutic strategies for muscular dystrophies, and new animal models of muscle pathologies, including zebrafish.

We are very grateful to the authors for translating the excitement of their work to the general readership of the *FEBS Journal*. What emerges from this Special Issue is that myogenesis is a dynamic and rapidly advancing research field. We hope that the papers collected here will help to link basic science on muscle stem cells and the mechanisms of their cellular interactions with translational biomedical research on severe myopathies for which no cure is yet available. This may help facilitate future new treatments. As well as forming a useful educational tool for the myogenesis community, we trust that this Special Issue might attract and motivate investigators from different scientific areas to this exciting field of research.

Pura Muñoz-Cánoves is an ICREA Research Professor and Cell Biology Professor at the Pompeu Fabra University in Barcelona (Spain). Her research focuses on the molecular mechanisms underlying skeletal muscle function both in physiological and in pathological conditions and, in particular, how muscle stem cells maintain quiescence, transit to proliferative expansion and differentiate to form new muscle fibres in response to tissue damage. Additional interests of her laboratory are the mechanisms regulating age-associated muscle wasting, and the physiopathology of muscular dystrophies, including the contribution of inflammation and fibrosis to dystrophy progression. She is a member of the Editorial Board of *FEBS Journal* and *Skeletal Muscle*.

Daniel Michele, PhD, is an Associate Professor in the Department of Molecular and Integrative Physiology and the Department of Internal Medicine at the University of Michigan. His research laboratory focuses on the molecular mechanisms of muscular dystrophies, using mouse and cellular models to understand how defects in protein glycosylation lead to loss of dystroglycan function and cause muscle, heart and brain phenotypes. He also serves as Director of the Physiology Phenotyping Core and as Director of the Frankel Cardiovascular Center Undergraduate Fellowship Program. He is a member of the Editorial Board of *FEBS Journal*.

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